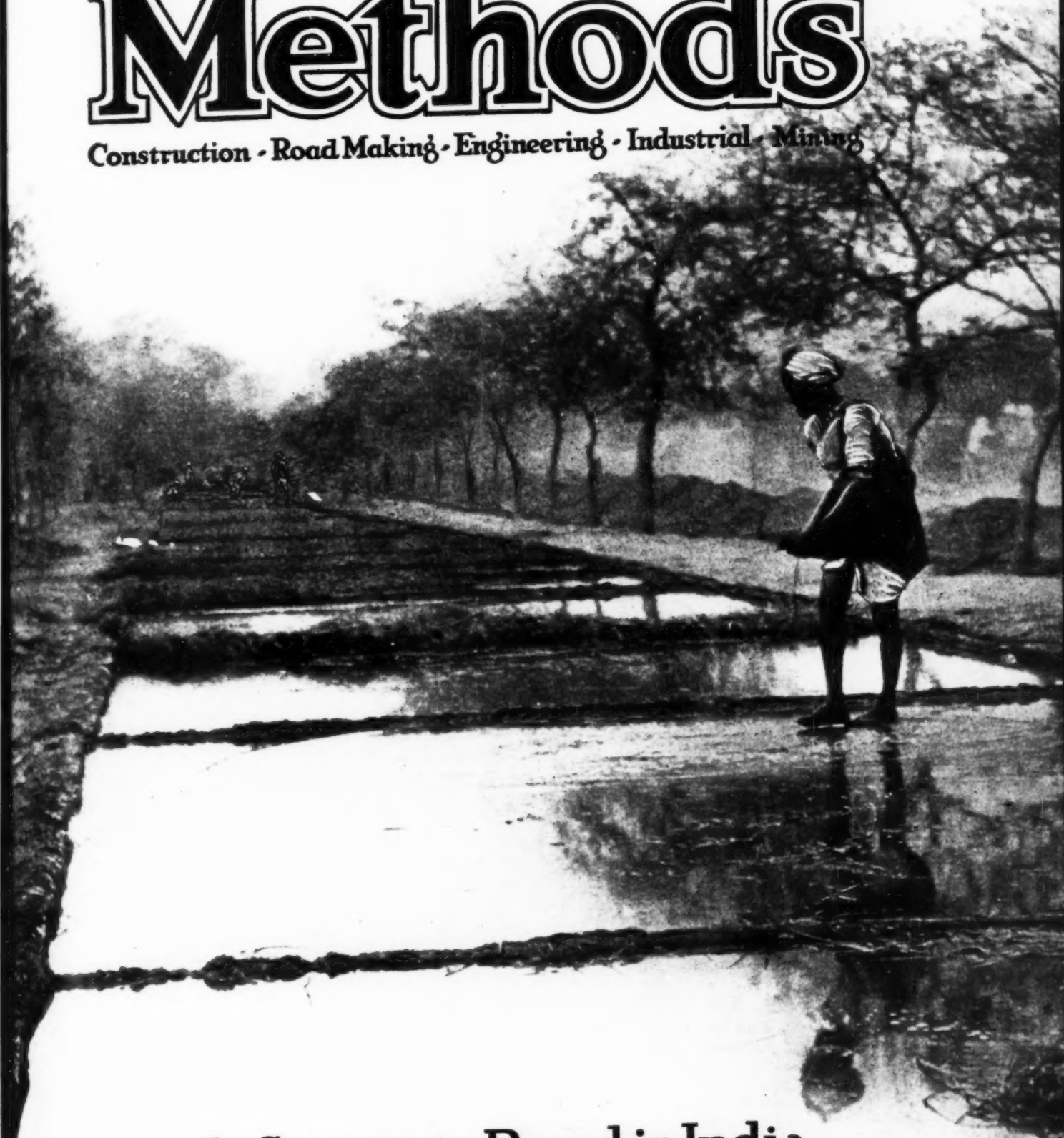


Successful Methods

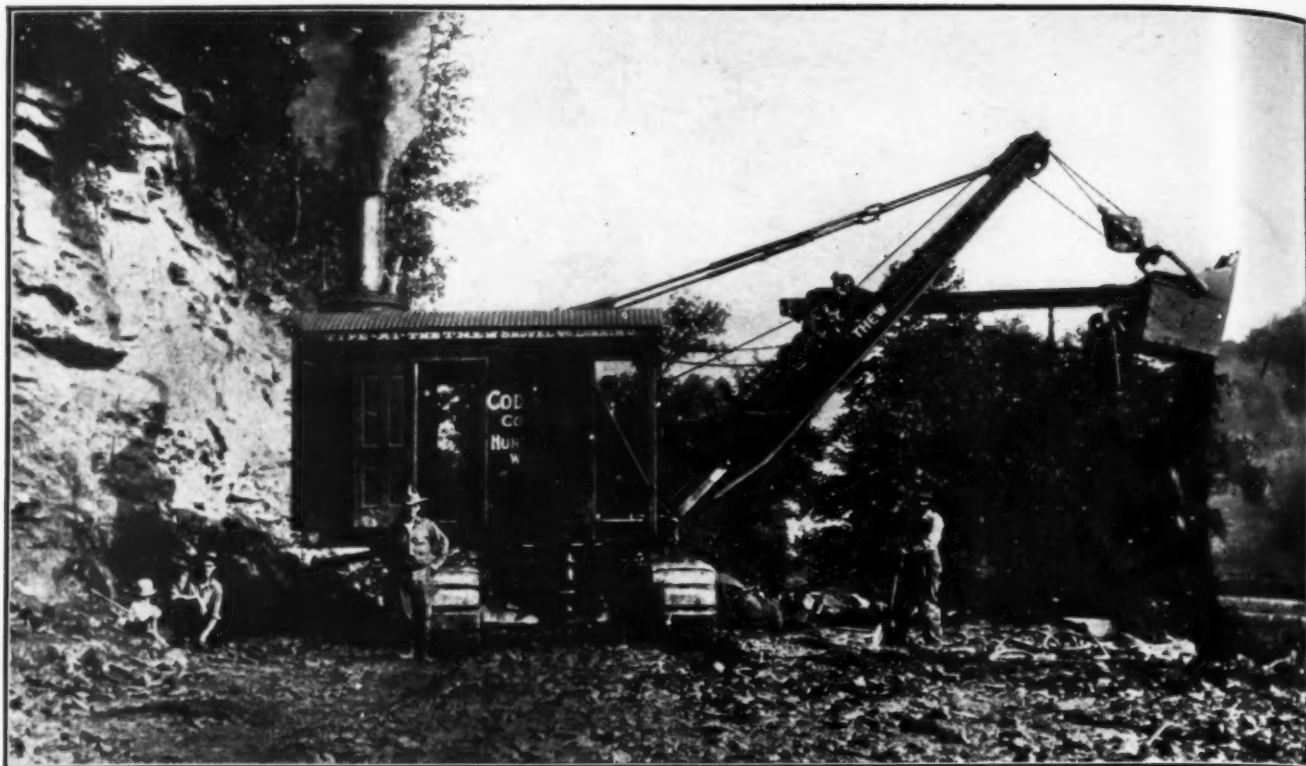
Construction · Road Making · Engineering · Industrial · Mining



A Concrete Road in India,

Vol.5. September 1923

No.9



The Thew One Yard Shovel Scores Again

Down in the mountains of West Virginia it takes real shovels to produce results. That's why the Thews there are popular.

This is what C. A. Nash of the Coda-Nash Company of Huntington, thinks:

"We are more than pleased with our Type A-1. We have had the shovel on this particular job 22 days. With the combined task of digging and holding to grade our shovel has completed a road 4600 feet in length and 26 feet wide. All digging has been in 100% rock.

From my experience with other makes and sizes of shovels I have yet to see a better machine than the 1 yard Thew. This machine is doing work that would test the mettle of any 2½ yard machine."

Mr. Nash knows shovels and shovel construction. Naturally he prefers the balanced Thew with its plate girder boom, powerful crowd, simple engines and real power steering caterpillar truck.

There is another of those instructive folders coming out this month. If you don't get your copy mention 623 when you write.

THE THEW SHOVEL COMPANY, LORAIN, OHIO

MADE IN U.S.A. PATENTED IN U.S.A. & FOREIGN COUNTRIES



Successful Methods

A Magazine of Construction Service

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Vol. 5

SEPTEMBER, 1923

No. 9

The Annual Inventory

THE mileage of improved highways built each year in this country runs into figures that are hard to grasp. In at least two States hard-surfaced roads are being completed this season at a rate averaging more than two miles every working day. The total average daily mileage of hard-surfaced roads that will be built this year will astonish the best informed. The mileage of all other new construction, of course, will be much larger.

We are moving ahead in highway affairs at a rate that requires every man interested in any way in such work to keep constantly on his toes if he hopes to stay in the procession. Methods are changing overnight. Men who are experts one season can be clear out of date the next, unless they keep in touch with the new ideas that are being so rapidly developed. Fortunately, there is one chance each year to learn in less than a week about all the new methods that have made good, and to see all the latest in road machinery and material. This comes at Chicago in January at the annual convention and road show of the American Road Builders' Association.

Elsewhere in this issue there appears a preliminary announcement of these two big events of the year in the highway industry. Frank Page, President of the Association, has made exactly the right move by appointing one man as manager of both the convention and show. This plan will eliminate the difficulties which committee management cannot avoid.

With C. M. Upham as manager, it is a certainty that the convention and show will be handled by a man who knows every angle of the highway industry. Mr. Upham also has demonstrated again and again that he is a real organizer. His record further proves that he can get big jobs done quickly and easily.

S. F. Beatty, President of the Highway Industries Exhibitors' Association, has advised Mr. Page that that association will cooperate to the fullest extent in working out plans for the road show. Demands for space for exhibits already are certain far to exceed what is available. This problem will be solved in the best way possible. At any rate it insures a road show that will be better staged than ever before.

In planning the program for the convention arrangements will be made so that at least half of the time will be available for discussion. The character of the program also is going to be more along the lines

of new methods and will have less to do with highly technical features than in the past.

January may seem quite a while away. Now is the time, however, to make your plans to be in Chicago then. You can see and hear more in a few days there about the new ways of doing the job cheaper and better than you could in months of travel. Mark on your calendar the week of Jan. 14 for the convention and road show in Chicago.

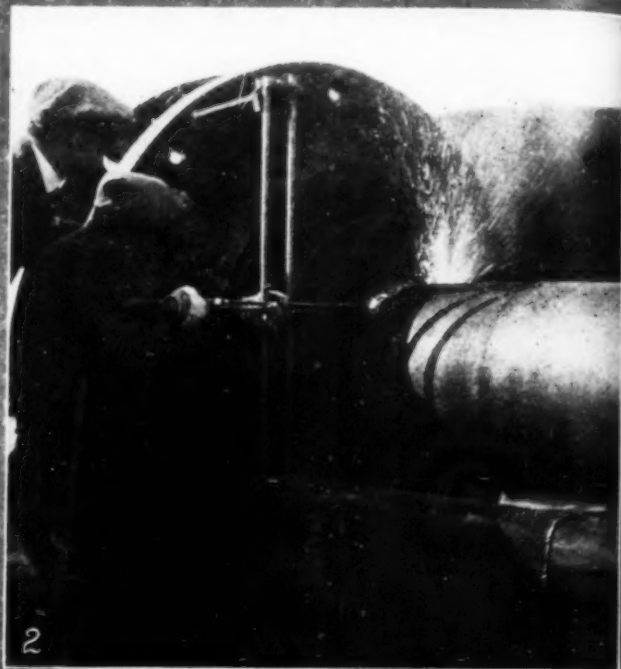
Big Railroad Work Comes Back

THE Southern Pacific is going to spend \$16,000,000 on a cut-off in Oregon. The Illinois Central is starting work on a 118-mile main-line cut-off in southern Illinois and western Kentucky. Various other big railroad jobs already are under way and more are pending. To all appearances the railroad builder is out of Egypt and at least at the edge of the promised land.

While the stay in the wilderness of no work has not lasted forty years, it is a long, long time since so much railroad building has been in sight as at present. Politicians, ignorant of business and ready to ride into office on any issue that would get votes, have for two decades found that attacks on the railroads kept them in jobs. The public finally caught on to the foolishness of hindering their own affairs by throttling the railroads. As a result, a partial relief has been afforded the railroads in the last year or so. With this has come a return of confidence in railroad securities that has made it possible to start improvements long ago seriously needed.

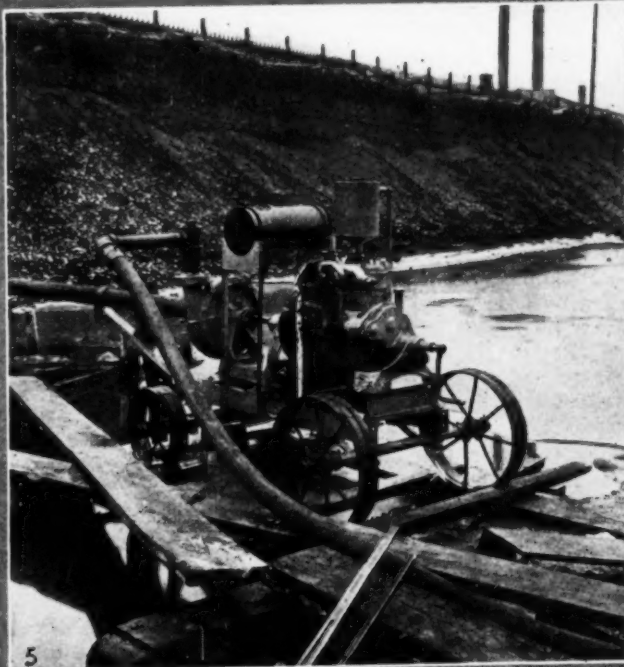
Recently, political developments again have indicated that we may only be on an oasis and not out of the desert of no railroad construction. The ignorant politician is back on the job, laying all the ills of humanity to the railroads. And he is getting a world of support, too. But before he can do much harm it is earnestly to be hoped that the country will wake up to the fact that the railroads must earn enough net to encourage investors to put up the money for the necessary extensions and improvements. Construction men of the country had better weigh the whole situation mighty carefully. Otherwise, they may be led astray in their thinking by some of the clever talkers and writers who are trying to hold on to or to gain jobs by unfairly discrediting the railroads.

Saws and Pumps



- 1—A rather primitive method of sawing a heavy log. This photograph was taken in India. © *International*
 2—Cutting through a big steel casting in an American railroad yard. The acetylene torch bit its way through 27 in. of steel in 15 min. © *P & A Photos*
 3—Carpenters sawing lumber with a portable sawmill on a building job in Milwaukee, Wis. This method is considerably quicker, safer and more economical than that shown in photograph No. 1

Old and New



4—Getting the water out of an excavation in short order with a small bilge pump.

5—This up-to-date power pump is getting rid of an oversupply of rain water so that the contractor can go on with his work.

6—In marked contrast with the two upper pictures is this archaic man and ox power pump in use in the Far East.

© E. Galloway

CAISSON FOUNDATIONS IN NEW YORK

Well-Organized Plant Keeps Work on Westinghouse Building Ahead of
Schedule

By O. F. LANGE,

Engineer in Charge, Fred T. Ley & Co., Inc.



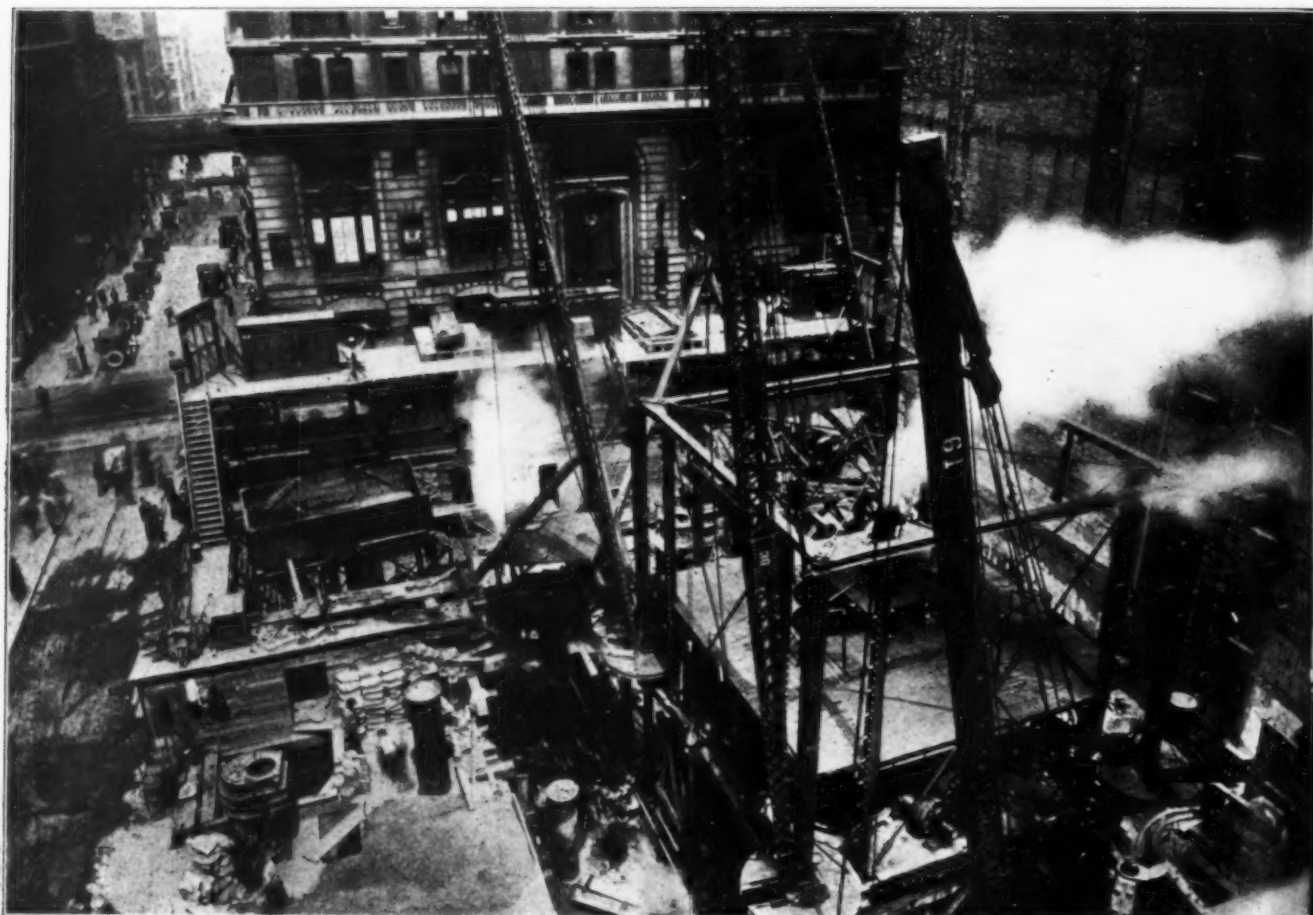
FOUNDATION work in the congested portions of New York City almost invariably presents interesting problems to the builder, both on account of the nature of the soil and the necessity for taking care of the surrounding buildings. The Westinghouse Building, now under construction at the northeast corner of Liberty Street and Broadway in the midst of the financial district, furnishes a good example of the difficulties with

which both contractor and engineer have to contend in New York City.

This building, which will be 23 stories in height, with one floor below the basement, will cover a plot 100 by 135 ft., and its height above the sidewalk level is to be 280 ft. Fred T. Ley & Co., Inc., is the builder, and Starrett & Van Vleck are the architects and

designers. The finished building is shown at the left.

The foundation work for this structure, consisting of excavation, installation of caisson foundations and retaining walls around the plot, was let by Fred T. Ley & Co., Inc., to the Foundation Company, one of the most experienced and reliable concerns in the field for execution of difficult foundation work. The foundation for the building consists of 5 rectangular caissons, some as large as 5 ft. 6 in. by 20 ft., and 32 circular caissons from 6 ft. 6 in. to 8 ft. 6 in. in diameter. All caissons were sunk to an average elevation of 70 ft. below curb level, at which level three of these reached rock and the remaining thirty-four caissons stopped on hardpan at elevation 65 and were poled out to a depth of 5 ft. below this elevation. For the circular caissons steel forms were used, and were removed as sinking progressed, and for the rectangular caissons wooden forms were used, which were left in place. The air pressure, under which the men in the caissons had to work, reached



A GENERAL VIEW OF THE PLANT LAYOUT LOOKING WEST TOWARD THE BROADWAY SIDE

approximately 20 lb.

The plant layout had to be studied with great care owing to the density of traffic on the two street sides. As ultimately laid out, the job was served by one four-boom traveler, which was moved once during construction in an easterly direction from its original position in the front of the lot. This equipment was supplemented by 3 stiff-leg derricks. On a bridge over the Liberty Street side of the property the cement shanty was located, and near it the concrete mixer, which discharged into a bucket on a flat car, which later could be run over a convenient track within reach of all derricks. The excavated material was carried by the derricks in buckets from the working chambers of the caissons to the hoppers, from which it was dumped into auto trucks. These hoppers were placed as follows: One on Broadway, one on Liberty Street, and two on a runway running north and south near the back of the lot.

Owing to the character of the soil in this part of the city and owing to the structures surrounding the building site, great care had to be taken in sinking



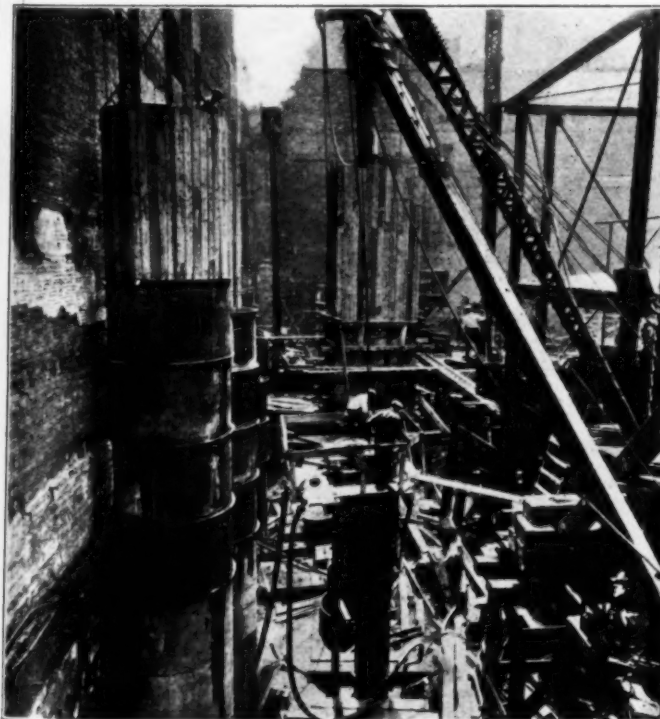
CAISSONS UNDER CONSTRUCTION SHOWING STEEL AND WOOD FRAME WORK

carried during the process of sinking caissons on pushers with jacks in the customary manner. During the construction of the concrete retaining walls along the street fronts, sheet piling and shoring were resorted to to hold the embankments in place. It is noteworthy that no damage was done to adjoining buildings and streets.

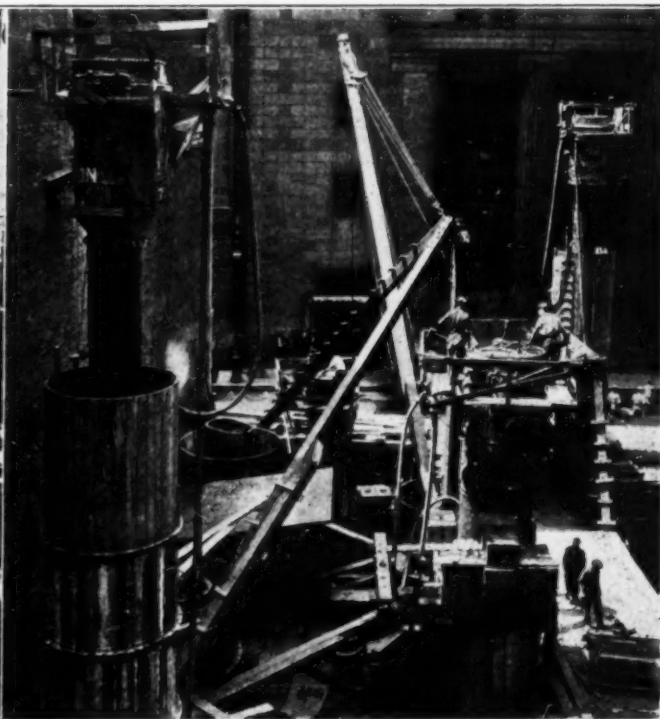
The speed realized in this whole operation was remarkable. Work was begun on May 7, 1923. This

these caissons. On the north side, the lot is bounded by the eighteen-story Lawyers Title & Trust Co.'s building, which rests on spread footings about 12 ft. below the excavation level for the new building. The 5 caissons adjacent to the wall of this building were sunk with particular care and the greatest possible speed, so as to minimize the danger of any settlement of the adjacent foundations. It is interesting to note that no shoring or underpinning was used on this side of the lot.

The wall of the five-story Joseph P. Day building, which constitutes the eastern boundary of the lot, had to be supported, and was



SINKING THE CAISSONS CLOSE TO THE WALL OF AN EIGHTEEN STORY BUILDING



THIS PHOTOGRAPH SHOWS THE AIR LOCKS IN OPERATION

consisted of locating and assembling the plant on the site. On June 8 the first caisson was put under air and the air was released from the last caisson on July 3. The contract of the Foundation Company was practically completed on July 24, which was 12 days ahead of the contracted-for date of completion.

The adequate equipment shown on the accompanying photographs is partly responsible for the speed and satisfactory completion of the work. The photographs give a good general idea of the derricks, air

locks, mixing plant, steel and wood forms and hoppers; they do not, however, show the extensive compressor plant which was located at the northeast corner of the lot. This compressor plant had two compressors, which supplied the caissons with air during construction and was also equipped to supply high pressure air to drills used in the removal of old walls. Compressor plant and all derricks were operated by steam supplied by the New York Steam Company.

ADDING TO LONDON'S BIG STORE

Building Operations in British Metropolis Are Proceeding on Large Scale

AN opportunity to compare New York construction methods with those which obtain in London is presented by the photograph which appears at the bottom of this page. It shows the work in progress on the extension to the store of Messrs. Selfridge & Co., Ltd., in Oxford Street, West, which, as most Americans know, is one of London's biggest department stores and was started by an American from Chicago. The extension to the Selfridge store is being built by F. D. Huntington, Ltd., of London, who also is engaged in numerous other construction operations in various parts of England and even has done work in the United States.

The photograph shows clearly how the materials

from the excavation are handled in small cars running on narrow-gage track. Several of the turntables used to turn the cars at right angles may be seen in the foreground. A Chicago firm of architects and engineers, Graham, Anderson, Probst & White, are the designers of this building with Sir John J. Burnet of London.

London, like New York, is one of these cities that "will be all right when it is finished," although the average American is inclined to think of it as a city which does not change much. Big building operations of one sort or another are constantly in progress, one of the most notable being the Bush Terminal building, which is a semi-American institution.



A LONDON BUILDING JOB

BLAST CHANGES COURSE OF RIVER

Diverts Water into Irrigation Ditches by Destroying Sandstone Cliff



BIG PIECES OF SANDSTONE IN RIVER AFTER BLAST

THE floods that perennially sweep down the Arkansas River upon Pueblo, Col., with disastrous effect, hollowed out a new channel, that in turn deprived many irrigation ditches of nearly all of their water. To remedy this situation it was decided to change the channel back to its old position by blasting a towering cliff of sandstone and limestone that overhung the channel.

The explosives had to be placed far back in the heart of the cliff, and work was begun on a tunnel 6 ft. high and 4 ft. wide. This was driven in for a

distance of 35 ft., then, after a drift of 5 ft., it was driven on for 10 ft. more. It was in this last tunnel that the charge was placed. To shatter the cliff a charge was used that consisted of 5000 lb. of black powder, with which was mixed 50 lb. of dynamite to secure better ignition. There was a terrific roar as



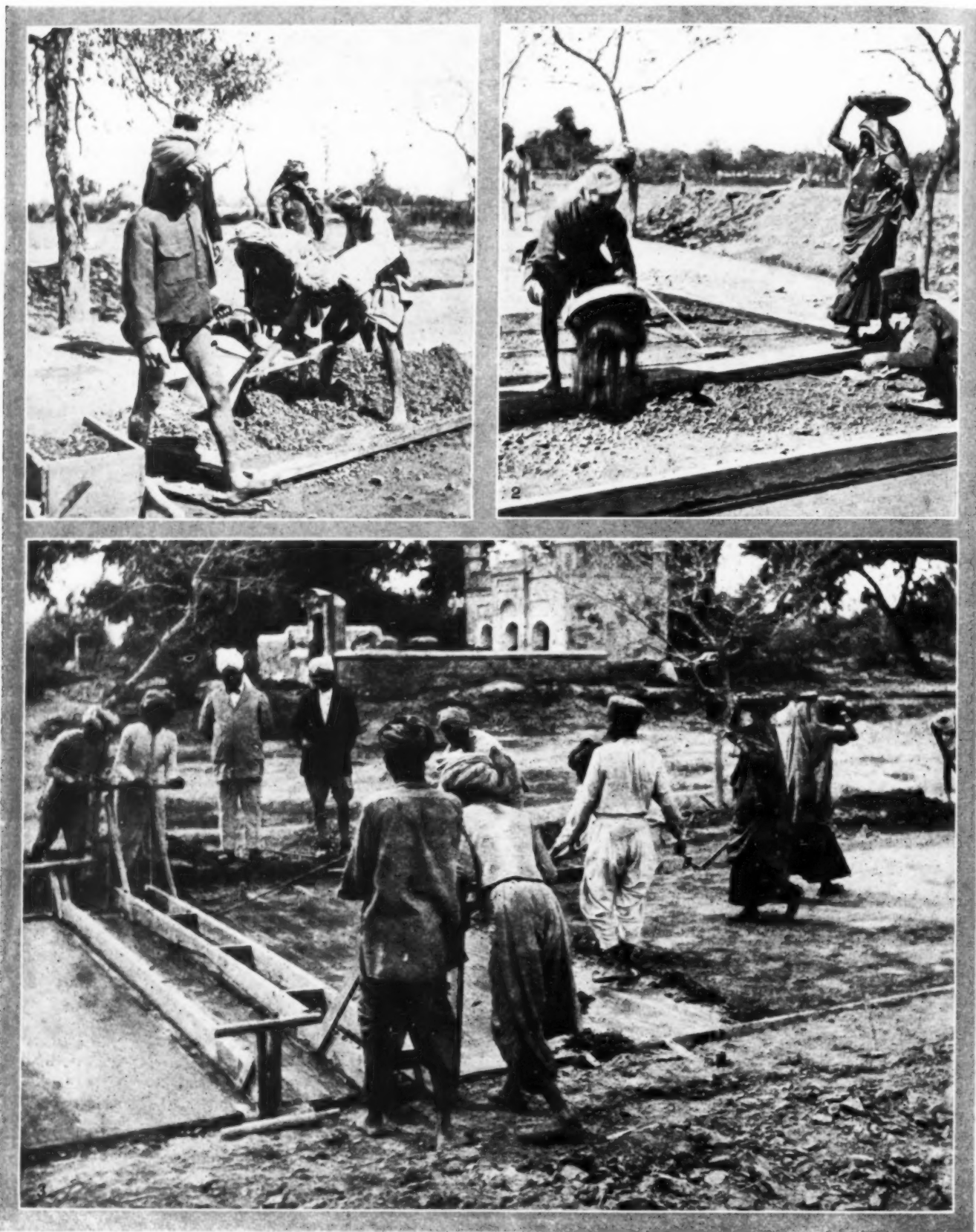
INSPECTING THE RESULTS OF THE EXPLOSION

the shattered limestone and shale came raining down. Then, when the rocks finally stopped rolling, it was seen that the plan had worked, for the channel was blocked and within a few minutes the irrigation ditches were receiving their full share of the water. Arthur, Potter & Allen of Pueblo did the work.



THE CLIFF AS IT WAS BEFORE THE CHARGE WAS FIRED

ROADBUILDING METHODS IN INDIA



THE cover of this issue of *SUCCESSFUL METHODS*, and the photographs on this and the next page, show the way in which roads are being built in India. The first photograph on this page shows the men at work mixing the concrete by hand. The second photo-

graph shows them placing it on the road and the third shows the crude finishing machine used for smoothing off the surface of the concrete. It will be noticed that women do the greater portion of the work. The cover photograph shows how the road is



cured by sprinkling water over it from a goat-skin.

The two pictures on this page show other phases of Indian roadbuilding. In the upper photograph boulders are being carried from the river bed to the

railway, where they will be broken up and used for surfacing highways. In the lower photograph the men are at work pouring bitumen on a bituminous penetration road near Lahore.



GRAVEL FROM EXCAVATION CUTS COST OF CONCRETE RESERVOIR

Tiled Trenches Used to Drain Foundation—Counterweighted Spouting System Used

By IVAN E. HOUK,

City Engineer, Dayton, Ohio

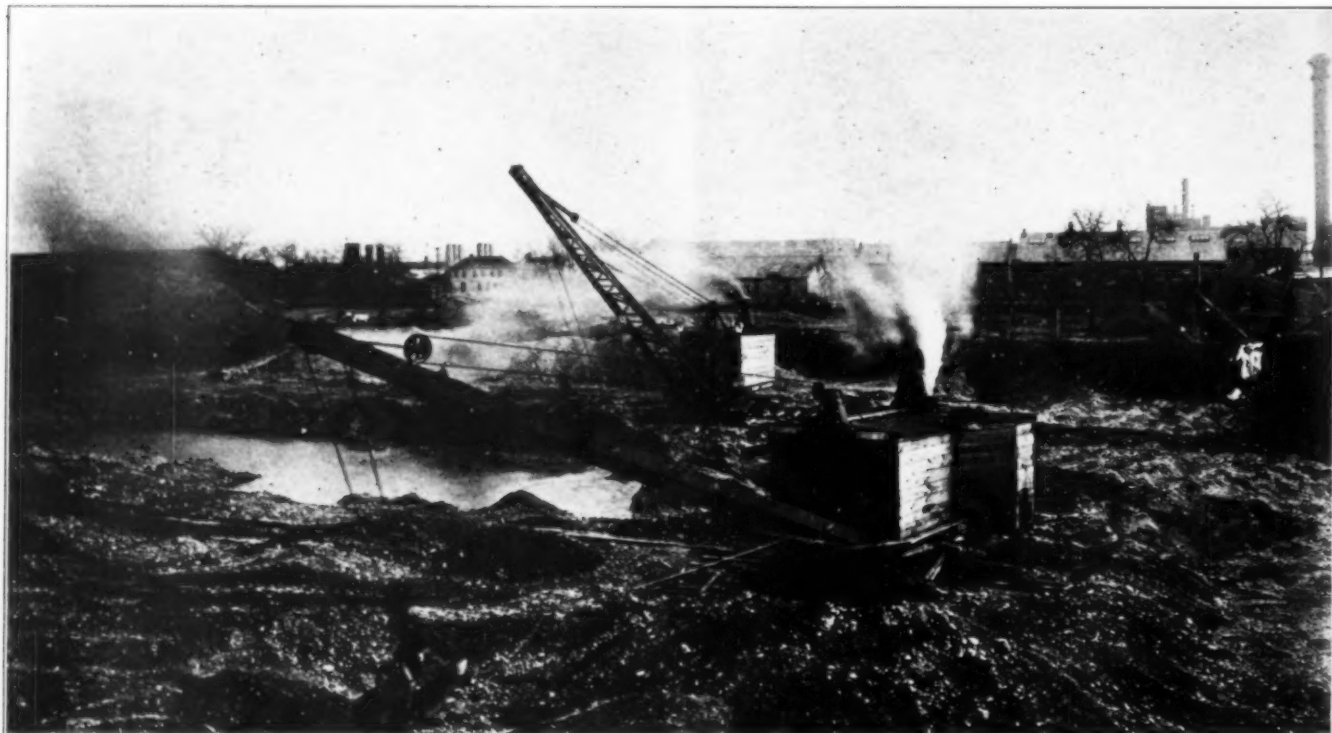
INTERESTING as well as efficient construction methods marked the building of a 5,500,000-gal. concrete waterworks reservoir in Dayton, Ohio, recently. The use of gravel from the excavation, properly separated and washed, in the concrete; a well-planned screening and washing plant, with an adjacent concrete mixing plant; a spouting distribution system reaching to all parts of the work, and a systematizing of labor operations enabled the contractor to finish the job, which had been taken at a comparatively low price, with a substantial profit instead of a loss.

The reservoir was built to serve as a suction supply for the main pressure pumps. It is rectangular in shape, 212 ft. by 248 ft. on the inside, 17½ ft. in the central portion, measured from the top of the floor to the bottom of the roof, and about 8 ft. deep at the sides. The bottom is a parabolic groined arch construction, varying in thickness from 8 to 26 in., with reinforcing under the column basis; while the top is a reinforced concrete slab 8½ in. thick. Columns 20 in. square, spaced 18 ft. on centers and reinforced with 1-in. round rods, support the top. The walls are the gravity type and vary in thickness from 5 ft. at the bottom to 15 in. at the top. They are designed to stand against the earth pressure on the outside or

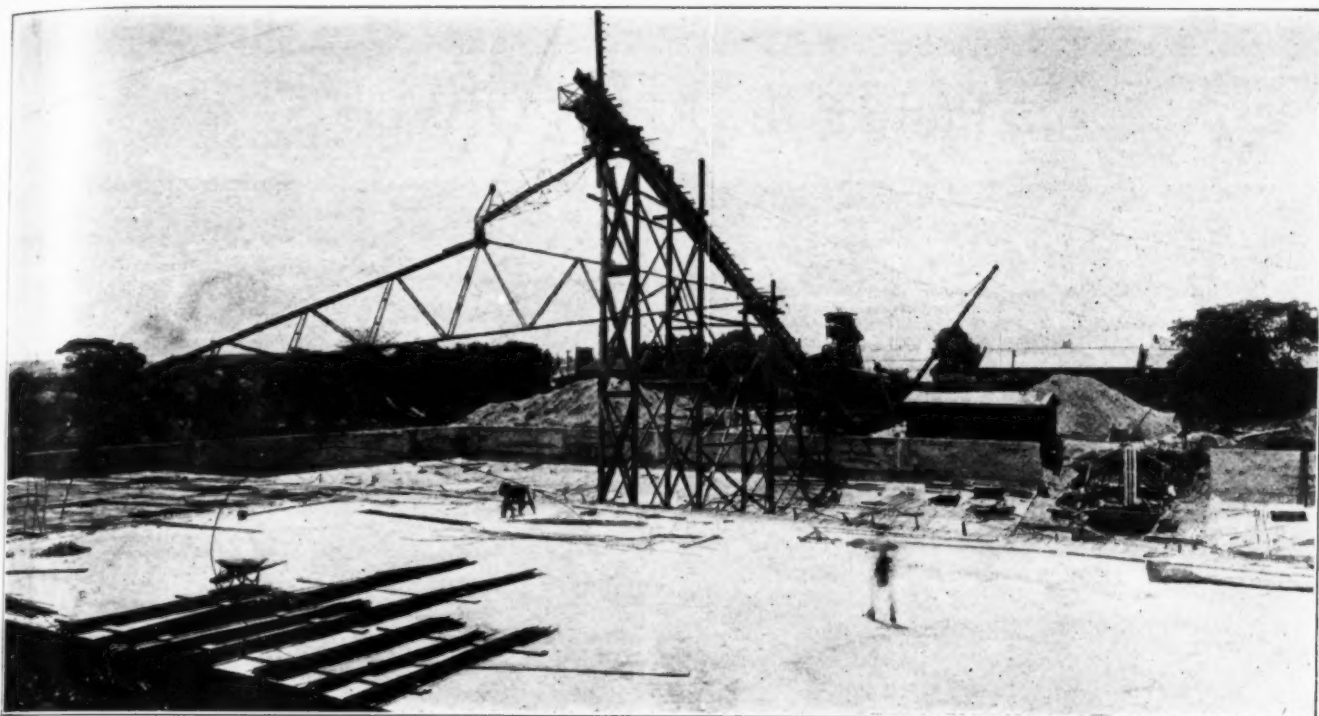
the water pressure on the inside, either acting independently of the other. Construction joints, 1 in. wide, filled with poured asphalt, were placed in the floor between the groins, and concrete sills, 12 in. wide and 8 in. deep, were placed under each joint.

The excavation, amounting to about 25,000 cu. yd., the lower half of which was gravel, was removed by two steam draglines of a new type manufactured by the contractor. A quantity of the best gravel, sufficient to supply the necessary aggregate for the concrete, was piled along the south side, where the screening and washing plant was later erected. Some trouble was encountered in draining the foundation, owing to the porous nature of the gravel and the proximity of Mad River, which flows just north of the reservoir, but it was overcome by laying tile in trenches along the locations of the construction joints and thus draining the water to a sump in one corner of the reservoir, where a centrifugal pump removed it.

The sloping part of the bottom was poured first, then the walls, in 36-ft. sections, separated by asphalt construction joints; then the floor proper, laying the sections alternately and pouring each continuously until finished, and finally the columns and roof slab. The groined arches were brought to the proper shape by the aid of 2-in. angles bent to the true curve and



A STEAM DRAGLINE MANUFACTURED BY THE CONTRACTOR HANDLED THE WORK OF EXCAVATION



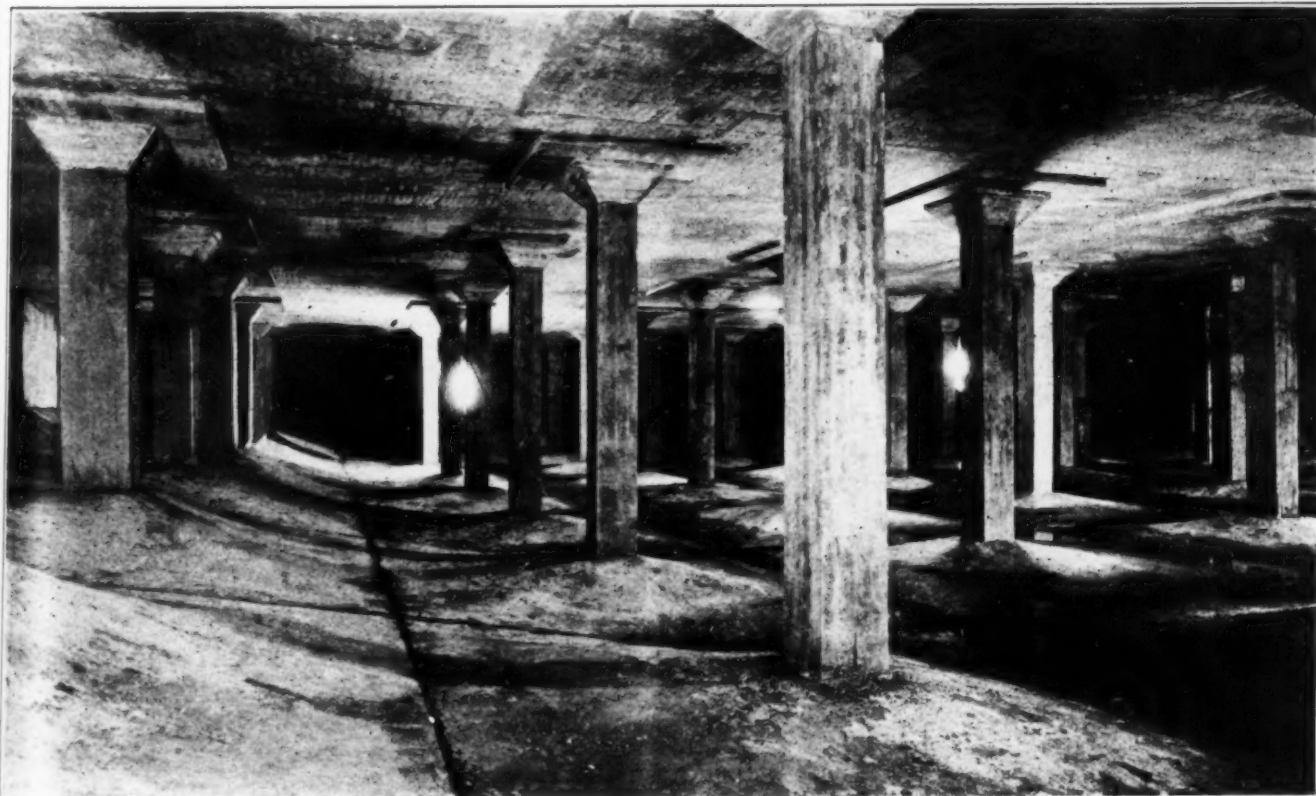
CONCRETE PLANT AT WORK POURING THE ROOF SLAB

suspended over the section being poured. Wooden forms were used for the columns, walls and roof slab.

The concrete was mixed in a 1-yd. mixer, driven by a motor and fed by a small dragline equipped with a clam-shell bucket, and was distributed through a counterweighted spouting system, set up in the center of the reservoir and composed of three sections, each 50 ft. long, giving a total reach of 150 ft. The screening and washing plant was also electrically

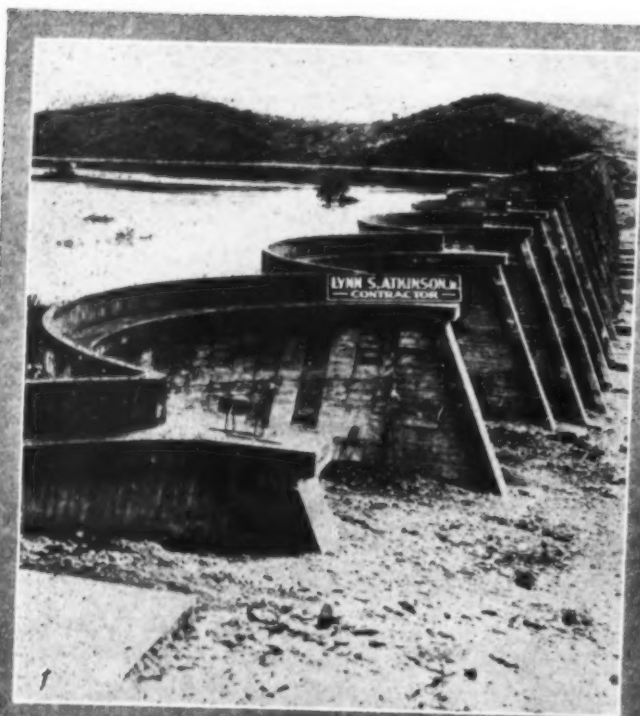
operated. The average unit labor cost for the 5000 cu. ft. of concrete placed, including screening and washing, mixing and placing, was \$1.08 per cu. yd., which is low for this section.

The reservoir was built by Glenn M. Wiley, a local contractor, under the supervision of the Division of Water, a division of the Department of Public Service. H. C. Wight was Superintendent of Water at that time. George F. Baker is Director of Public Service.



THE COMPLETED RESERVOIR, SHOWING THE CHARACTER OF CONSTRUCTION

Putting the Rivers to Work



- 1—Flood control dam recently completed on Cave Creek, near Phoenix, Ariz. The contractor was wise enough to advertise his wares prominently. © Keystone
 2—The famous Hetch Hetchy or O'Shaughnessy Dam which is to supply water to the City of San Francisco, and which has just been completed. © International
 3—The Don Pedro Dam near Turlock, Cal., which supplies water for irrigation and also adds to the state's hydro-electric resources. The building of this dam was described in the April issue of Successful Methods.

THE CASH VALUE OF GOOD ROADS

Florida County Proud of Highways That Were Regarded as Poor Investment
When Built Five Years Ago—Plans to Extend System

By C. A. TAYLOR,

Treasurer, William P. McDonald Construction Co.

THE public as a general thing seems to be more interested in methods of work that are going on today than in the history of work that has been done in the past. But sometimes it is worth while to look backward and consider construction that has been in use for some years and to see whether or not the construction used and the methods adopted have proved worth while.

This is a story of the experience of Polk County, Florida, with a good roads movement which started about 1915. Polk County is located in the center of the peninsula. This county is not what one is taught to believe is typical of the whole State, for there is a general impression that Florida is a flat land of swamps and woods of pine trees. Polk County is one of the largest counties in the State and has a great variety of topography, some parts of it being quite flat and swampy and other parts being rolling sand hill country covered with the original growth of pine.

The soil conditions in this country, looked at from the standpoint of a roadbuilder, present some problems that are not met with in all parts of the country.

For on the sand hills the question of drainage is taken care of by the natural seepage, but on the flat lands there is the problem of taking care of the swamp water, which covers quite large areas in places.

In 1916 Polk County was practically without hard surfaced roads. But due to the activities of the local good roads association, which carried on an extensive campaign of education, Polk County decided to embark on a program of this kind of road building.

The question might arise as to why this country decided to build a large mileage of hard-surfaced roads. A large part of Polk County is given over to the cultivation of citrus fruits, and there are few farm products that produce a larger tonnage per acre than does this crop. Also, due to the fact that the sand roads which were then in use in a large part of Polk County were very uncertain means of travel, it was almost impossible to get this county settled up and developed unless a system of hard-surfaced roads were built.

With this end in view the county commissioners of the county employed the H. S. Jaudon Engineering



HERE IS THE WAY THE ROAD GANG LIVED AMONG THE PINES

Company of Elberton, Ga., to lay out a system of roads and to draw up a set of plans and specifications under which these roads could be built. In April, 1916, Polk County advertised the letting of the largest mileage of sheet asphalt pavement that had ever been laid at one time in the United States. The specifications called for 216 miles of roadway to be improved with 1,500,000 sq. yd. of sheet asphalt pavement. The contracts were awarded in the fall of 1916 to the following contractors: Wm. P. McDonald Construction Company of New York, the Continental Public Works Company of New York, the Eureka Paving Company of Houston, Tex.; the Edwards Construction Company of Tampa, Fla., and E. C. Humphreys of Hackensack, N. J. The bridges for this work were awarded to the Champion Bridge Company of Wilmington, Ohio.

The type of construction adopted was a 2-in. standard sheet asphalt pavement, laid on a 4-in. clay base. The clay base which was used on this project is composed of local clay, which is found in various parts of the country, and the clay itself varies greatly. The best quality of clay is what is known as the Bartow clay, and there are quite large deposits of it at Holbrook, near Bartow. But it is apparently the only deposit of its kind in Polk County. In the country known as the "flat woods" there are quite numerous deposits of a sticky clay that borders on the marl. In sections of the county there are large deposits of phosphate rock, and on the top of the actual phosphate rock there is a mixture of phosphate rock and clay

that was used as a base. Then in what is known as the "ridge section," there are occasional deposits of what we call a red clay which is really composed of about 10 to 12 per cent of clay, the balance being a sand containing an iron oxide which gives it the red color. This material had been used quite largely on local roads and had proved very satisfactory except for a tendency to grind up and blow away in dry weather.

The construction problems that confronted the contractors on this project were largely a question of organization and of finding and employing the skilled labor that was necessary on this work. There seemed to be quite a sufficient supply of common labor to be obtained locally.

The first operation was to clear the right-of-way of the timber that in some places was quite heavy. The grading was then done with slip scrapers, wheelers, and in some places by shoveling into wagons and hauling the fills into place. On one road the contractors used a steam shovel and dinkies in building the grade. After the grading was done, the next problem was to locate clay deposits, which in most instances were readily found within reasonable haul of the road. The clay bed having been located and the overburden removed, the contractor then proceeded to lay the clay base, which operation was very similar to the laying of an ordinary macadam road, with which everyone in this section is familiar. After the clay was deposited on the road, the roadway was thrown



WHAT THE ROADBUILDERS FOUND WHEN THEY ARRIVED ON THE SCENE READY FOR WORK

open to traffic and the base compacted by the traffic which ordinarily traveled the road, the constant use of road drags and blade machines being necessary to form the road into proper shape.

After the clay base had been laid a sufficient time, the asphalt plants were started, and no provision having been made for border curbs, a 2-in. board was laid flat along the edge of the road and held in place



GETTING OUT THE NATIVE CLAY

by iron pins. Then the asphalt wearing surface, 2 in. thick, was laid. The next day the border boards were picked up and moved ahead and used again.



THE ASPHALT PLANT IN FULL SWING

Some of the features that came up on the construction of this work were the moving of the portable asphalt plants across country. In one instance an asphalt plant was moved 9 miles from the railroad, when it was found that a local sand suitable for the construction of this road was available at that point and that it was cheaper to haul the asphalt and mineral filler 9 miles from the railroad to the plant site than it was to locate an asphalt plant on the railroad and then haul all of the pavement the long distances necessary.

These roads were completed in the fall of 1918,



HOW THE ROADS LOOKED WHEN THE JOB WAS DONE. THEY ARE IN FINE SHAPE TODAY.

and in the early part of 1923 the writer drove over a large part of them with the idea of determining how well this type of construction had stood up under five years' service. A careful inspection of this 200 miles of road showed that less than 5 per cent of these roads had failed and that the most of these failures were due to lack of drainage.

At the time the roads were built there was a strong sentiment in Polk County to the effect that the roads would not last and that the county was making a bad investment. The sentiment in Polk County today is that the good roads laid in 1916 have proved the best investment that the country has ever made, for it has caused great developments to be made, and the increase in the assessed valuation of the property has provided sufficient taxes to pay the cost of the interest on the bonds and provide for their retirement. The fact that the county believes that this was a good in-

vestment is shown by the fact that it is now contemplating a large addition to its system of good roads.

The good roads have aided in the development of the county, as shown by the fact that in 1918 the Atlantic Coast Line had a single-track railroad running south from Haines City, over which at that time they had one passenger train and one mixed train each way a day. Such a large volume of traffic has developed along this branch that they have been compelled to double track it in order to take care of the freight tonnage that originates on this branch.

This work was carried on during the war period and many difficulties had to be overcome. It is the opinion of the writer that it would never have been completed if it had not been for the hearty cooperation of the Board of County Commissioners of the county, and it was due to their fairness and honesty in aiding the contractors to meet these difficulties

LOADER HANDLES TWO JOBS

Removes Material from Subgrade and Then Turns to Loading Sand

IN building a section of the Lincoln Highway between Metuchen and New Brunswick, N. J., T. H. Riddle, the contractor, has been making full use of his equipment. One unit of his plant is a bucket loader, which he first put to work following up the scarifier which had torn up the old macadam. The bucket loader, as shown in one of the photographs, picked up this loose macadam from the subgrade and discharged it at the side of the road.

When this part of the work was finished the same machine was employed for loading sand into the 4-batch trucks which supplied the mixer. Each batch

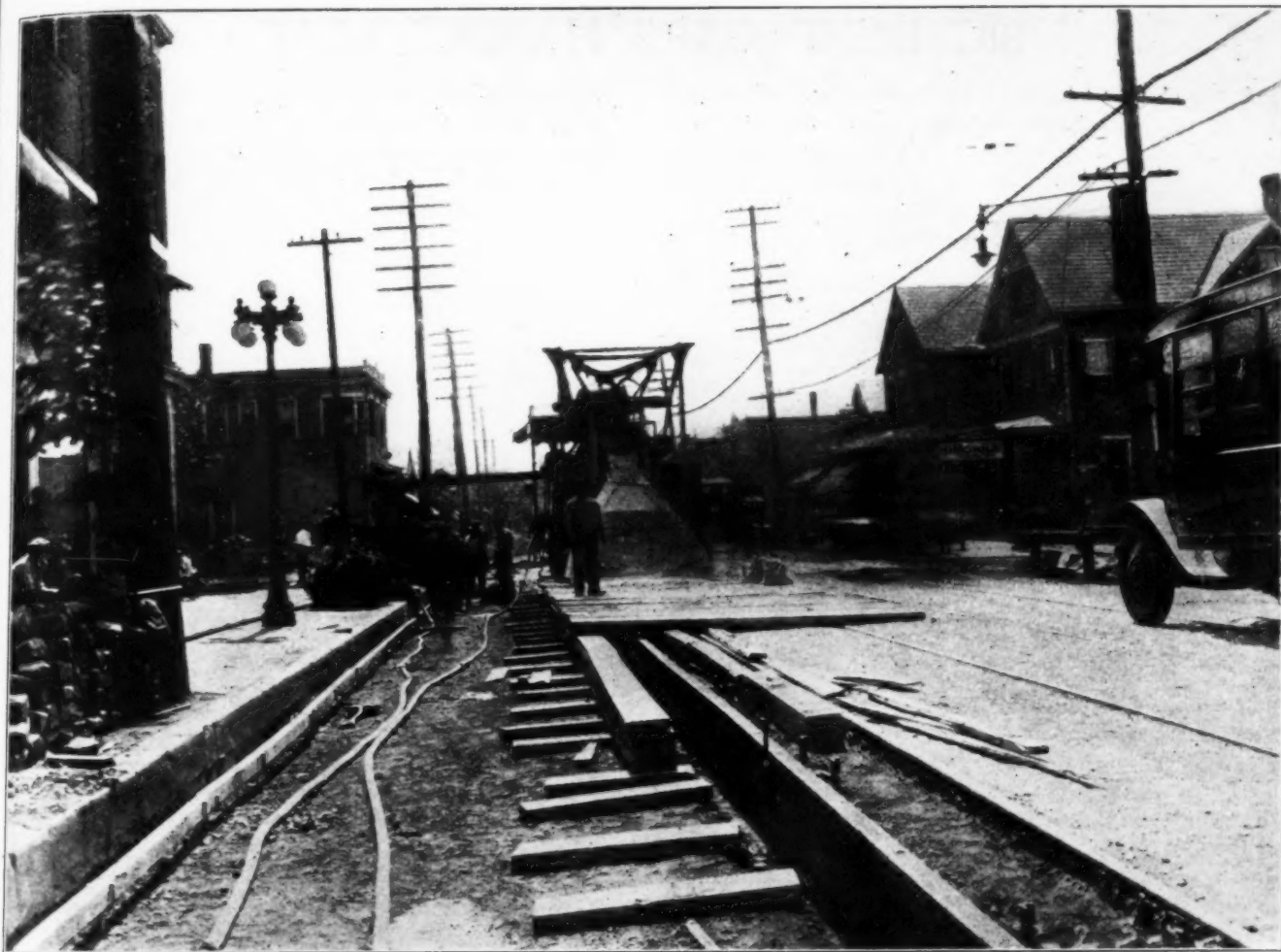


LOADER CLEARING THE SUBGRADE



LOADING TRUCKS WITH SAND

consisted of 12 cu. ft. of sand, and a measuring hopper, which may be seen in one of the photographs, was placed on the loader. An inspector rode on the measuring hopper and signalled the operator, using a whistle when the hopper was filled to the proper capacity. A hoe was used to strike off any extra sand.



PAVER AT WORK IN NEW BRUNSWICK. PLANKS KEEP IT LEVEL

The average loading time for each truck was 2 min.

The large photograph at the bottom of this page shows how Mr. Riddle handled the big paver when he reached the city of New Brunswick. By the exercise of considerable diplomacy he persuaded the trolley company to abandon one of its trucks temporarily,

thus giving him room for the big mixer. Switches were installed at each end of the job, so that the cars could shift over.

A minor problem involved was the support of the mixer on the subgrade. Mr. Riddle used heavy planks to keep the mixer on an even keel.

AMERICAN ROAD BUILDERS PLAN 1924 CONVENTION AND SHOW

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and in the early part of 1923 the writer drove over a large part of them with the idea of determining how well this type of construction had stood up under five years' service. A careful inspection of this 200 miles of road showed that less than 5 per cent of these roads had failed and that the most of these failures were due to lack of drainage.

At the time the roads were built there was a strong sentiment in Polk County to the effect that the roads would not last and that the county was making a bad investment. The sentiment in Polk County today is that the good roads laid in 1916 have proved the best investment that the country has ever made, for it has caused great developments to be made, and the increase in the assessed valuation of the property has provided sufficient taxes to pay the cost of the interest on the bonds and provide for their retirement. The fact that the county believes that this was a good in-

vestment is shown by the fact that it is now contemplating a large addition to its system of good roads.

The good roads have aided in the development of the county, as shown by the fact that in 1918 the Atlantic Coast Line had a single-track railroad running south from Haines City, over which at that time they had one passenger train and one mixed train each way a day. Such a large volume of traffic has developed along this branch that they have been compelled to double track it in order to take care of the freight tonnage that originates on this branch.

This work was carried on during the war period and many difficulties had to be overcome. It is the opinion of the writer that it would never have been completed if it had not been for the hearty cooperation of the Board of County Commissioners of the county, and it was due to their fairness and honesty in aiding the contractors to meet these difficulties

LOADER HANDLES TWO JOBS

Removes Material from Subgrade and Then Turns to Loading Sand

IN building a section of the Lincoln Highway between Metuchen and New Brunswick, N. J., T. H. Riddle, the contractor, has been making full use of his equipment. One unit of his plant is a bucket loader, which he first put to work following up the scarifier which had torn up the old macadam. The bucket loader, as shown in one of the photographs, picked up this loose macadam from the subgrade and discharged it at the side of the road.

When this part of the work was finished the same machine was employed for loading sand into the 4-batch trucks which supplied the mixer. Each batch

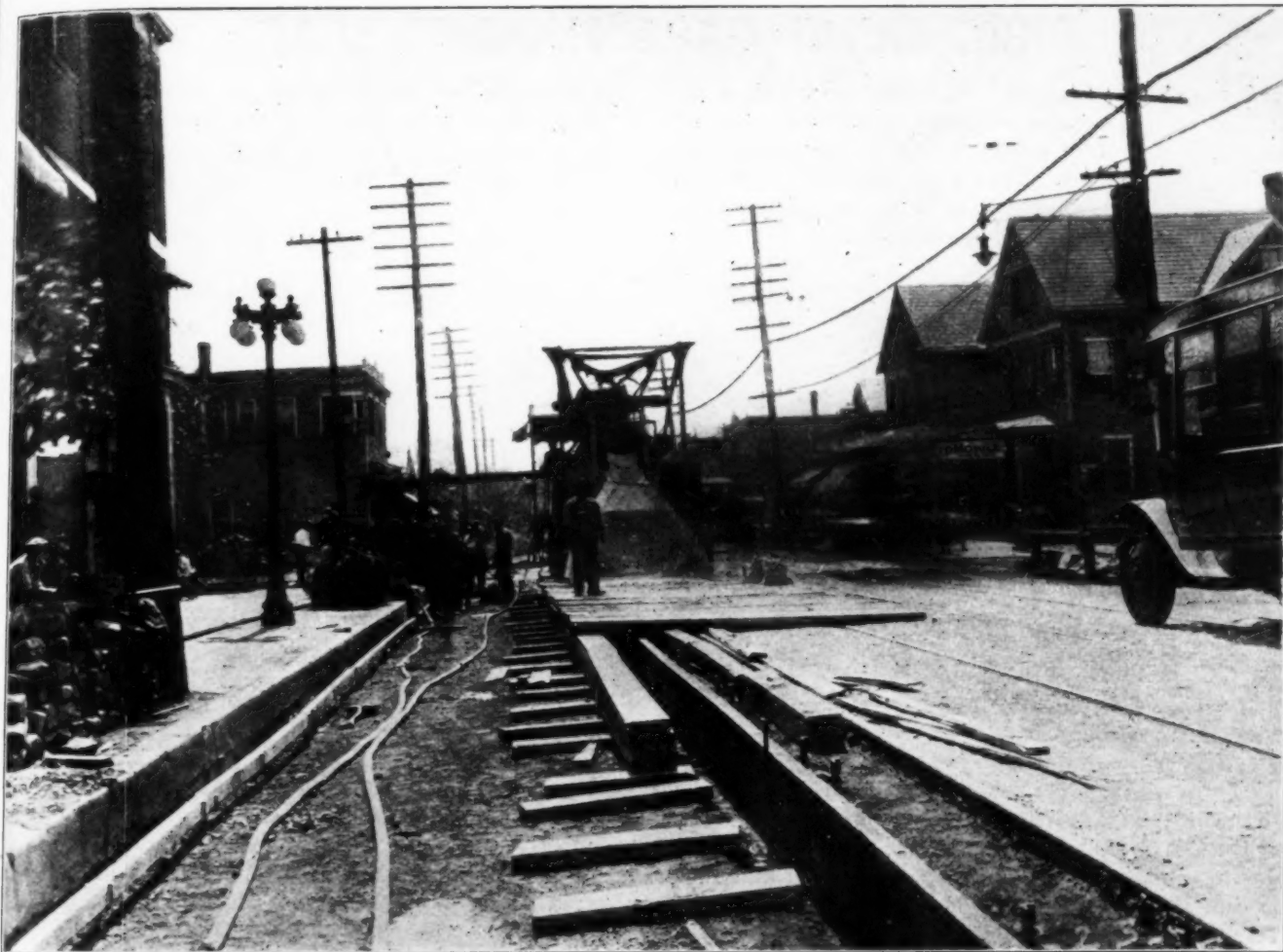


LOADER CLEARING THE SUBGRADE



LOADING TRUCKS WITH SAND

consisted of 12 cu. ft. of sand, and a measuring hopper, which may be seen in one of the photographs, was placed on the loader. An inspector rode on the measuring hopper and signalled the operator, using a whistle when the hopper was filled to the proper capacity. A hoe was used to strike off any extra sand.



PAVER AT WORK IN NEW BRUNSWICK. PLANKS KEEP IT LEVEL

The average loading time for each truck was 2 min.

The large photograph at the bottom of this page shows how Mr. Riddle handled the big paver when he reached the city of New Brunswick. By the exercise of considerable diplomacy he persuaded the trolley company to abandon one of its trucks temporarily,

thus giving him room for the big mixer. Switches were installed at each end of the job, so that the cars could shift over.

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BIG DUMP CARS HANDLE SLAG

IT has been discovered in recent years that hard slag, not granulated, can be crushed and used precisely as limestone can be crushed and used, in the making of concrete, ballasting railroads, for highway purposes, etc. Much of it still is wasted in the form of granulated slag, for the market will not yet absorb it all, but the crushing of hard slag and the disposition of granulated slag have given rise to a new industry.

Its operation in the Youngstown, Ohio, district may be cited as typical. There is a concern known as the Standard Slag Company, which handles most of the slag produced in that district. It handled, in fact, more than a million tons last year. The hard slag is worked up into aggregate for concrete, into railroad ballast, and highway paving material, at some twelve or fifteen crushing plants. Sharpsville, Pa., has a typical crushing plant. There the slag is crushed precisely as limestone is crushed and for the same purposes. During the winter the finished product is stored for summer use, being handled successfully in automatic

compression lock, air dump cars, of 30-cu. yd. capacity.

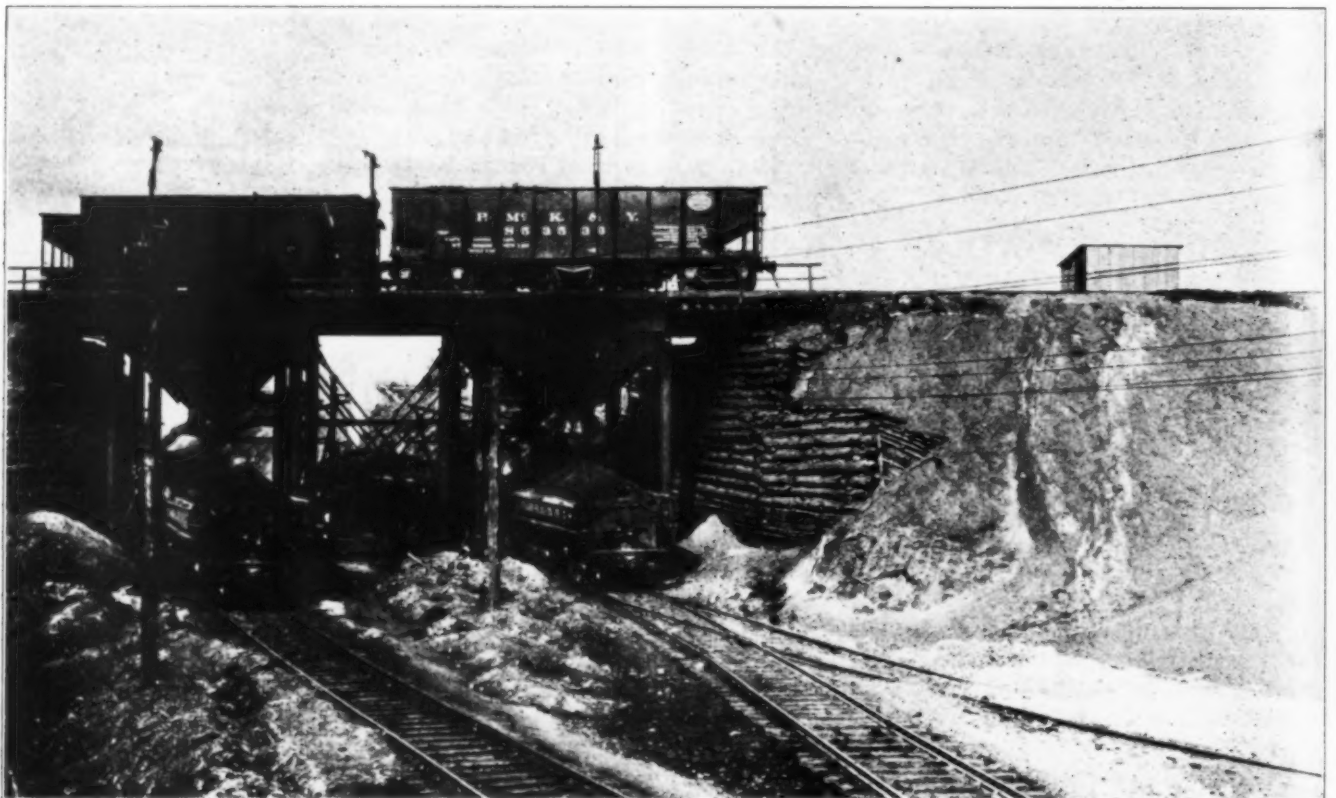
Even more interesting is the disposition of the granulated slag, which is still wasted. A great dump has been established at Niles, Ohio. Another is being established at Pulaski, Pa. At Niles two permanent trestles have been built, each with two bins beneath, and a loading track under each bin leading to the dump. The dump is a large tract of low ground, back of the Grasselli Chemical Works. As the low ground is being filled to the height of the adjoining plant, and thus made available for plant purposes.

Granulated slag is brought to Niles in bottom dump, railroad cars, from which the bins are filled. Trains of 30-yd. automatic compression

lock, air dump cars, like those used in storing slag products at Sharpsville, are loaded under the bins and taken to the dump. An average of 90 cars of slag is loaded at the bins each day, and the material is handled in six of the big dump cars. Eight dump cars are stationed at Niles, but six usually are able to take care of the slag.

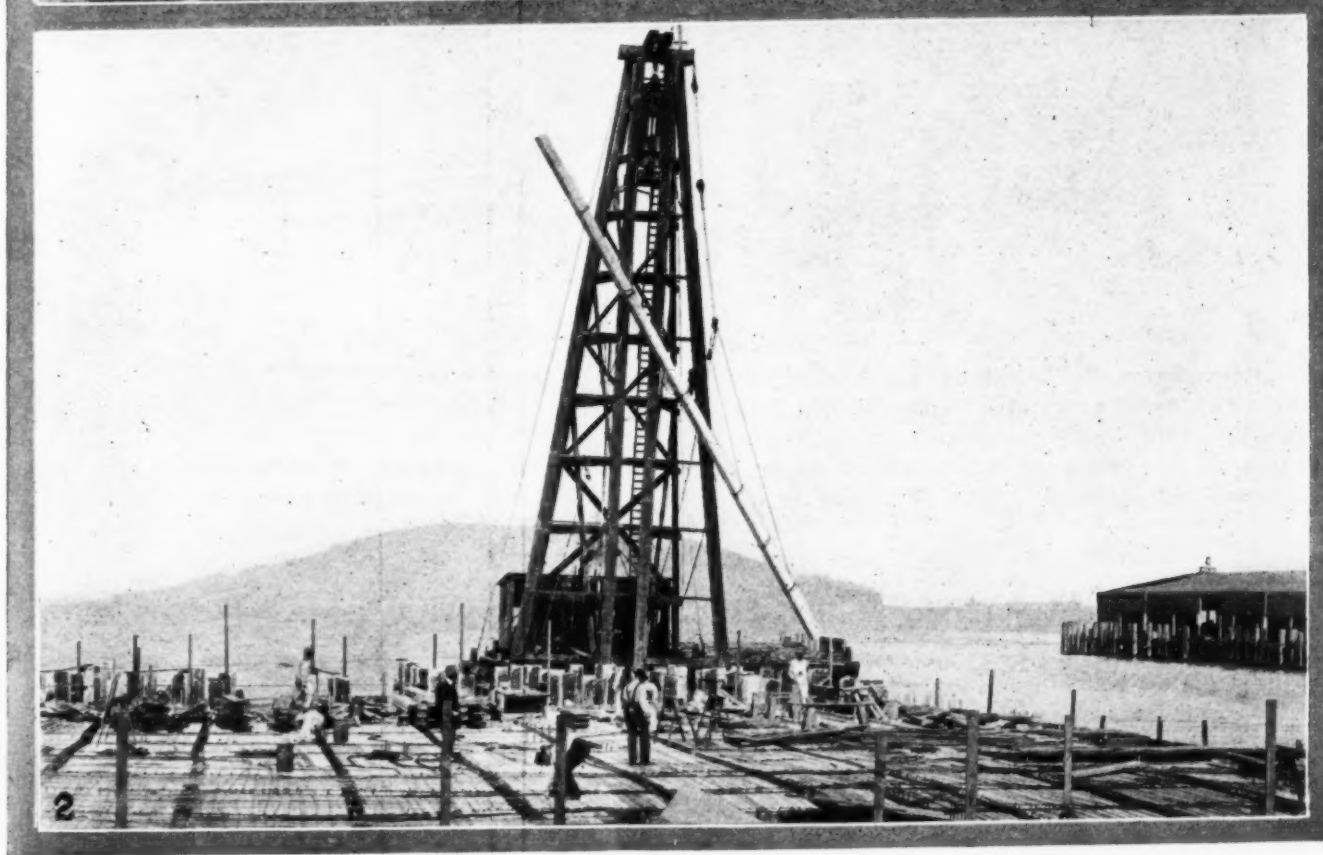


DISPOSING OF WASTE SLAG AT NILES, OHIO



LOADING DUMP CARS WITH SLAG AT NILES

Two Ways of Doing a Job



1—A primitive pile-driver in Japan, operated by women. © International
2—A modern American pile-driver handling an enormous concrete pile on the Pacific coast.

DELICATE BLASTING REMOVES CONCRETE UNDER BOILERS

AN unusual and difficult blasting job with dynamite was recently accomplished at the plant of the Spicer Manufacturing Corporation, South Plainfield, N. J., by Lawrence C. Longstreet, a blaster of Dunellen.

The work consisted of the removal of a block of reinforced concrete approximately 6 ft. by 2½ ft. by 20 ft., extending through and under two 300 hp. water tube steam boilers. The removal of the concrete was occasioned by the change of stokers under the boilers, and as the change reduced the power generating capacity of the power house and consequently closed down part of the plant in the interval, it was of vital importance to get the work done within the scheduled time with the least possible disturbance to that portion of the boiler masonry which did not require removal.

In order to do the job Mr. Longstreet used something over 200 charges, each of which was so carefully placed and gaged as to accomplish the exact object without risk to adjacent structures, which included not only the piers and columns supporting the boilers themselves but also a pier under a column which was one of the main supports to the overhead bunkers and building.

To add to the complexity of the situation, portions of the concrete were so hot from the previous boiler fires that Mr. Longstreet found it necessary to cool the concrete in order to make it safe to receive the charge.

In doing the work Mr. Longstreet used 125 electric caps and 40 lb. of 40 per cent dynamite.

The officials of the Spicer Manufacturing Co. were well satisfied with the prompt and satisfactory job.

COMPRESSED AIR CUTS LABOR COSTS

THE back-breaking, hand-sledging methods of opening streets have been eliminated in San Francisco by the Board of Public Works, the gas and



power companies, the telephone and telegraph companies, the water company and the leading contractors. By using an air compressor on an automobile truck or trailer pavement cutting and breaking hammers have been applied to opening streets by all the

above-mentioned concerns. Three such hammers, it is estimated, can do in from 30 to 40 min. what formerly took four or five men over four hours to accomplish.

The old method is clearly illustrated by the photograph which vividly shows five men in action with a



heavy sledge hammer. The compressed air method is shown in the other photograph.

DELAYING THE GOOD ROADS MOVEMENT

THE road contractor who at this season of the year is straining every nerve to get his job finished on time and begrudges every moment of lost time will do well to consider the fate which recently overtook the Sloane Construction Company on a job near Sandpoint, Idaho. The "Associated Contractor," the official publication of the Pacific Northwest Branch of the Associated General Contractors of America, tells the story.

At midnight the entire road gang was called out by the sheriff of Bonner County to hunt down two men who had shot and killed a pool room owner in a nearby town. Under the law the men, of course, had to go. This presents a brand new hazard in the road-building game which already seems to be hazardous enough.

Just what the sheriff would do if he encountered one of those convict road camps is another problem.



These Accessories are Important! Select them with Care

BE SURE that the du Pont label is on your blasting accessories as well as on the explosives themselves—for the finest explosives made will not deliver maximum effect unless used with the best detonators and accessories. The experience of 121 years enables the du Pont Company to offer the most efficient and economical accessories for every class of explosives work.

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Leading Wires	Cap Crimpers
Tamping Bags	Thawing Kettles

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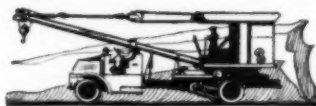
Du Pont Products Exhibit, Atlantic City, N



A Universal Mounted on a Motor Truck Is a Sound Investment



These cranes unload cars and hurry from pile to pile making miscellaneous or straight truck loads, doing away with the greatest part of the former waste loading time. The trucks earn more. The necessary investment is lessened materially.



Full Circle Swing No Outriggers Needed



A tough job but the Universal cleaned it up quick. Such work and digging out old building foundations is good paying work for this crane.

The Universal Crane is a sound investment being a year 'round machine, which winter and summer, cleans up the work it would otherwise take a large gang of laborers to do. Through the winter you find them handling coal, iron, steel, etc. and bulk materials, or snow from the streets at the rate of two minutes per truck.

Universals have replaced from 20 to 30 men on different kinds of work. They handle 6 to 10 hopper and gondola cars of sand, coal, etc. per day under ordinary conditions. Such material handling is a direct answer to the present labor question.

You can have a Universal mounted on one of your 5-ton or heavier used truck chassis and you should earn from \$50.00 to \$100.00 a day with it. Do you wonder there are no used Universals available?

Let us tell you all about this *Full Revolving Crane* equipped with its own heavy duty, 4-cylinder gasoline engine developing 100% excess power. It is the *only motor truck mounted Crane* that handles a loaded $\frac{1}{2}$ -yd. grab bucket (3800 to 4200 lbs.) without outriggers or extra counterweight on good level ground at 17 to 18 ft. radius and at any position of swing.

You will be interested in the well illustrated Construction Field Bulletin No. 22.

Tear out this page now and mail with your letter head for a copy.

The UNIVERSAL CRANE Co.

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